

CLAIMS

What is claimed is:

1. A clean-emissions method for generating energy comprising the steps of:
5 vaporizing a high-grade fatty acid composition via distillation from a feed composition including at least one of an animal fat and a vegetable oil, leaving a non-vaporized natural oil byproduct;
 burning the natural oil byproduct to release energy; and
 harnessing energy released by burning the natural oil byproduct to drive a
10 process.
2. The method of claim 1, wherein the natural oil byproduct is burned in a furnace in which the natural oil byproduct is substituted, in whole or in part, for another type of fuel, the substitution of the natural oil byproduct producing a decrease in emission of at least one pollutant chosen from nitrous oxides, sulfur oxides, carbon monoxides and particulate matter.
3. The method of claim 2, wherein the fuel for which the natural oil byproduct is substituted is chosen from distillate number 2 fuel oil, residual number 6 fuel oil, and coal.
4. The method of claim 2, wherein the substitution of the natural oil byproduct for the other type of fuel in the furnace reduces one or more emitted pollutant concentrations to a level
20 within a limit established by a regulatory agency, wherein burning the other fuel without the natural oil byproduct to produce the same amount of energy would emit one or more pollutants at a concentration above the established limit.
5. The method of claim 2, further comprising the step of determining the ratio of concentration of natural oil byproduct to concentration of the other fuel that will produce
25 emitted pollutant concentrations within established limits and burning at least that concentration of natural oil byproduct in combination with the other fuel.

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- 6. The method of claim 1, further comprising the step of hydrolyzing the feed composition to remove glycerine before distillation.
- 7. The method of claim 1, wherein the natural oil byproduct comprises free fatty acid and unhydrolyzed fat/oil.
- 5 8. The method of claim 7, wherein the natural oil byproduct further comprises unsaponifiable impurities and oxidized, polymerized fatty materials.
- 9. The method of claim 7, wherein the natural oil byproduct comprises about 20% to about 50% by weight free fatty acid and from about 20% to about 70% by weight unhydrolyzed fat/oil.
- 10 10. The method of claim 9, wherein the natural oil byproduct further comprises about 2% to about 5% by weight unsaponifiable impurities and about 2% to about 7% by weight oxidized, polymerized fatty materials.
- 11. The method of claim 1, wherein the natural oil byproduct is substantially free of sulfur compounds and nitrogen compounds.
- 15 12. The method of claim 1, wherein the feed composition comprises coconut oil, soybean oil, canola oil, sunflower oil, linseed oil, tallow and animal greases.
- 13. The method of claim 1, wherein the distilled, high-grade fatty acid composition comprises at least about 90% of the distillation feed material by weight fatty acid.
- 14. The method of claim 1, wherein the natural oil byproduct is burned in a furnace of a
20 boiler.

15. A clean-emissions method for generating energy comprising the steps of:
- burning a natural oil byproduct comprising about 20% to about 40% by weight free fatty acid and from about 20% to about 70% by weight unhydrolyzed fat/oil to release energy; and
- 5 harnessing energy released by burning the natural oil byproduct to drive a process.

16. The method of claim 15, wherein the natural oil byproduct is burned in a furnace in which the natural oil byproduct is substituted, in whole or in part, for another type of fuel, the substitution of the natural oil byproduct producing a decrease in the emission of at least one pollutant chosen from nitrous oxides, sulfur oxides, carbon monoxides and particulate matter.

17. The method of claim 16, wherein the fuel for which the natural oil byproduct is substituted is chosen from distillate number 2 fuel oil, residual number 6 fuel oil, and coal.

18. The method of claim 16, wherein the substitution of the natural oil byproduct for the other fuel reduces one or more emitted pollutant concentrations to a level within a limit established by a regulatory agency, wherein burning the other fuel without the natural oil byproduct to produce the same amount of energy would emit one or more pollutants at a concentration above the established limit.

19. The method of claim 16, further comprising the step of determining the ratio in concentration of natural oil byproduct to the other fuel that will produce emitted pollutant concentrations within established limits and burning at least that concentration of natural oil byproduct in combination with the other fuel.

20. The method of claim 15, wherein the natural oil byproduct further comprises about 2% to about 5% by weight unsaponifiable impurities and about 2% to about 7% by weight oxidized, polymerized fatty materials.

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29. The method of claim 24, wherein the natural oil byproduct comprises free fatty acid and unhydrolyzed fat/oil.
30. The method of claim 29, wherein the natural oil byproduct further comprises unsaponifiable impurities and oxidized, polymerized fatty materials.
- 5 31. The method of claim 29, wherein the natural oil byproduct comprises about 20% to about 50% by weight free fatty acid and from about 20% to about 70% by weight unhydrolyzed fat/oil.
32. The method of claim 31, wherein the natural oil byproduct further comprises about 2% to about 5% by weight unsaponifiable impurities and about 2% to about 7% by weight oxidized, polymerized fatty materials.
33. The method of claim 24, wherein the natural oil byproduct is substantially free of sulfur compounds and nitrogen compounds.